

Indicator Development and Integrated Assessment of Environmental, Economic, and Social Aspects for Establishing a Sound Material-Cycle Society

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[Abstract]

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For appropriate monitoring of the medium- to long-term direction in the Fourth Fundamental Plan for Establishing a Sound Material-cycle Society – "Thorough Circulation of Resources throughout the Lifecycle of Goods and Services," a group of indicators was proposed based on six cross-sections of the material life cycle: resource input from the environment, raw material input to the production process, raw material utilization in the production process, product use, end-of-life product treatment, and waste disposal to the environment. After a material flow database was developed for major materials used in Japan (vinyl chloride, iron, rocks and gravel, agricultural products, wood), the six major indicators were applied to those material flows to demonstrate the usefulness of the proposed indicators. In addition, in response to the medium- to long-term direction of the Fundamental Plan – "Integration of Efforts toward Creating a Sound Material-cycle Society into Those for a Sustainable Society" and "Regional Revitalization through the Formation of Diverse Regional Circulating and Ecological Sphere," an evaluation methodology was developed to evaluate integrated efforts for the environment, economy, and society. The methodology, based on Input–Output Analysis, clearly indicates the flow of waste and byproducts. It was applied to major resource recycling efforts (domestic recycling of waste plastics, promotion of effective utilization of forest residue in the region) to demonstrate the usefulness of the proposed methodology. Furthermore, for an indicator expressing integrated environmental and economic efforts – "market size of business for a Sound Material-cycle Society," the new target business and its classification (based on business approach (3R + Renewable) and based on "value" provided by the business) was proposed. The estimation method and the estimation results for the base year and recent year were demonstrated. Moreover, to provide a database of indicators and improve international comparability, circular economy indicators used and examined for policy evaluation or monitoring in the EU and major European countries were reviewed. A database of indicators was developed, including their definitions, calculation methods, and necessary data. For Japan and Europe, details of differences in the definitions of major indicators (general waste recycling rate and cyclical use rate at inlet) were examined. Then necessary measures to improve compatibility were proposed together with the trial estimation results.

[References]

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A framework of indicators for associating material stocks and flows to service provisioning - Application for Japan 1990–2015